SUGGESTED SCOPE-OF-WORK BOREHOLE LOGGING REQUIREMENTS

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These logging requirements are suggested for use in scopes-of-work requiring drilling and sampling. The geologist should carefully consider each requirement as it applies to the project at hand and modify each as appropriate. Additional requirements may be necessary for a specific project. Consult USACE guidance on monitoring well installation for detailed guidance.
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1. Logs shall be prepared in the field, as borings are drilled, by a qualified, experienced geologist or geotechnical engineer. Each log shall be signed by the preparer.

2. All log entries shall be legibly written. Photo reproductions shall be clear and legible. Illegible or incomplete logs will not be accepted. Original logs shall be submitted to USACE as borings are completed.

3. Borehole depth information shall be from direct measurements accurate to 0.10 feet.

4. Logs shall be prepared on the appropriate log forms (ENG 1836 or HTW version of the ENG 1836, unless the Contractor's forms are approved by the USACE project geologist). Forms are available from the USACE.

5. All relevant information blanks in the log heading shall be completed. Drilling location (referenced by measured distances from prominent surface features) shall be described on the log.

6. Log scale shall be 1 inch = 1 foot.

7. Each and every material type encountered shall be described on the log form.

8. The characteristics of the unconsolidated materials shall be described as per ASTM D 2488 and EM 1110-1-1804 Geotechnical Investigations:

    a. descriptive USCS classification, including percentages

of primary and secondary components (i.e. 80% sand, 20% silt)

b. plasticity and consistency of cohesive materials or apparent density of non-cohesive materials;

c. moisture content assessment, e.g., moist, wet, saturated, etc.;

d. color;

e. other descriptive features (grain angularity, bedding characteristics, organic materials, macrostructure of fine-grained soils; e.g., root holes, fractures, etc.);

f. depositional type (alluvium, till, bess, etc.).

9. Rock materials shall be described in accordance with standard geologic nomenclature, including:

a. rock type and formation name;

b. relative hardness and degree of cementation;

c. density;

d. texture;

e. color;

f. weathering;

g. bedding;

h. fractures, joints, bedding planes, and cavities, including any filling material and whether open or closed; and

i. other descriptive features (fossils, pits, crystals, etc.).

10. Stratigraphic/lithologic changes shall be identified by a solid horizontal line at the appropriate scale depth on the log which corresponds to measured borehole depths at which changes occur, measured and recorded to the nearest 0.1 foot. Gradational transitions, changes identified from cuttings or methods other than direct observation and measurement shall be identified by a horizontal dashed line at the appropriate scale depth based on the best judgment of the logger.

11. Logs shall clearly show the depth intervals from which all samples are retained.

12. Logs shall identify the depth at which water is first encountered, the depth to water at the completion of drilling and the stabilized depth to water. The absence of water in borings shall also be indicated. Stabilized water level data shall include time allowed for levels to stabilize.

13. Logs shall show borehole and sample diameters and depths at which drilling or sampling methods or equipment change.

14. Logs shall show total depth of penetration and sampling. The bottom of the hole shall be identified on the log with the notation "bottom of hole."

15. Logs shall identify any drilling fluid losses including depths at which they occur, rate of loss and total volume lost.

16. Logs shall show drilling fluids used including, as appropriate:

a. source of make-up water;

b. drill fluid additives, if allowed by this contract, by brand and product name, and mixture proportions; and

c. type of filter for compressed air.

17. Logs shall show depths and types of any temporary casing used.

18. Logs shall identify any intervals of hole instability.

19. Intervals of lost bedrock core shall be shown. Intervals of intact soil sampling attempts shall also be shown, including depths from which attempts were made and length of sample recovered from each attempt. Bedrock coring information shall be recorded in consecutively numbered runs and shall include the following:

a. depth to top and bottom of each core run;

b. length of core recovered from each run;

c. size and type of coring bit and barrel; and

d. measured depth to the bottom of the hole after core is removed from each run.

20. Any special drilling or sampling problems shall be recorded on logs, including descriptions of problem resolutions.

21. Logs shall include all other information relevant to a particular investigation, including but not limited to

a. odors;

b. HNu/OVA measurements or other field screening or test results; and

c. any observed evidence of contamination in samples, cuttings or drilling fluids.